4-WIRE EQUALIZED TRANSMISSION ONLY (4WETO) CHANNEL UNIT, 628210

GENERAL DESCRIPTION

CONTENTS PAGE

1. GENERAL 1
2. DESCRIPTION 1
3. FUNCTIONAL OPERATION (FIG. 2) 1
TRANSMIT VF CIRCUIT 1
RECEIVE VF CIRCUIT 3
4. OPTIONS 3
5. RESTRICTIONS 3
6. TEST AND MAINTENANCE FEATURES 3
7. TECHNICAL SUMMARY 3
8. REPLACEABLE PARTS 4
9. REFERENCES 5

1. GENERAL

1.01 This Section provides a general description of the ITT D448 4-wire equalized transmission only (4WETO) channel unit, 628210 (Fig. 1), to the functional block diagram level.

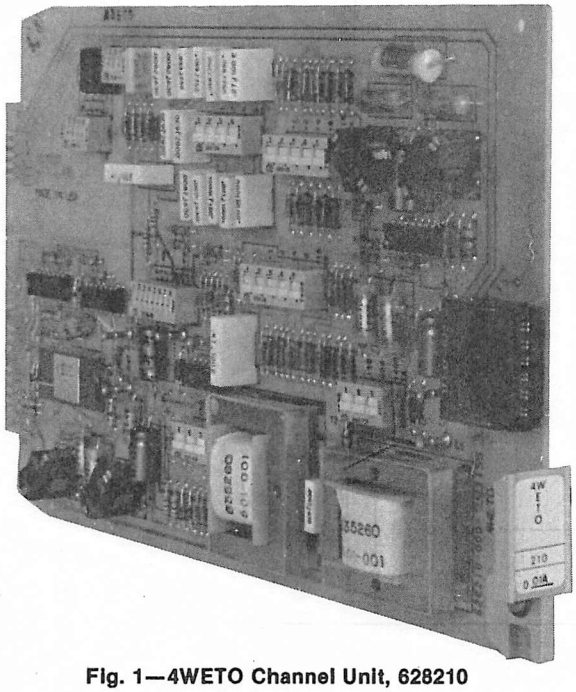


Fig. 1—4WETO Channel Unit, 628210

1.02 Whenever this Section is reissued, the reasons for reissue will be listed in this paragraph.

1.03 The unit provides a voice frequency (VF) interface between the central office (C.O.) equipment and the D448 multiplex terminal common equipment. In the transmit direction, the unit converts VF information into pulse code modulation (PCM) for application to the common equipment. In the receive direction, the unit decodes received PCM into VF information. The unit provides a 600-ohm, 150-ohm, or 1200-ohm, 4-wire, 2-way VF message circuit for dedicated trunks.

2. DESCRIPTION

2.01 The unit mounts in the D448 multiplex shelf (channel unit mounting section) in connectors J1A through J24A (for Digroup A) or connectors J1B through J24B (for Digroup B). Installation procedures for the units are provided in Section ITTR-18-441.

2.02 The unit is available in Group -0 only.

2.03 The unit consists of an epoxy-glass printed circuit board (PCB) and associated circuit components. The lower front edge of the PCB is fitted with a handle to facilitate insertion and removal of the unit from the shelf. An identification strip on the handle face indicates the unit mnemonic (4WETO), last three digits of the model number, last three digits of the part number, and issue letter. The part number and issue letter are also located on the component side of the PCB.

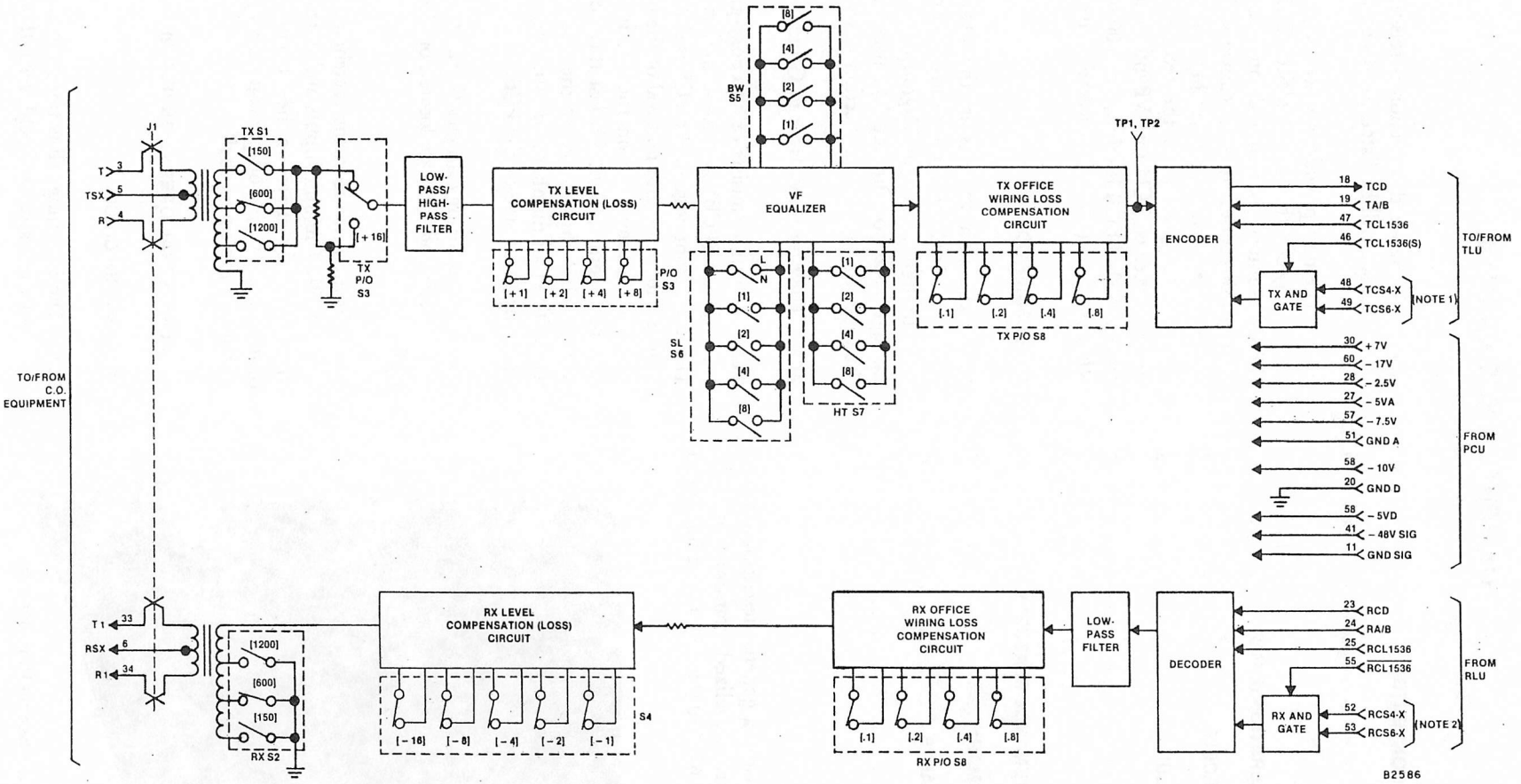
2.04 The splitting card jack (J1) and EQ OUT test points (TP1 and TP2) are located on the front edge of the PCB.

2.05 Printed circuit wiring is etched on both sides of the PCB. The unit inputs and outputs are terminated in gold-plated contacts on the rear edge of the PCB. These contacts mate with a 60-pin contact edge connector on the rear of the multiplex shelf.

3. FUNCTIONAL OPERATION (FIG. 2)

TRANSMIT VF CIRCUIT

3.01 The incoming VF is transformer-coupled, via part of the transmit (TX) level DIP switch and attenu-



NOTE:
1. MAY BE TCS4-A, B, C, OR D AND TCS6-A, B, C, D, E, OR F DEPENDING ON POSITION.
2. MAY BE RCS4-A, B, C, OR D AND RCS6-A, B, C, D, E, OR F DEPENDING ON POSITION.

Fig. 2—4WETO Channel Unit, 628210, Functional Block Diagram

ator, to the low-pass/high-pass filter where it is amplified and filtered. (The transformer has a multiple-tapped secondary that allows a 600-ohm impedance to be matched to a 150-ohm, 600-ohm, or 1200-ohm line by the selection of switch options [150], [600], or [1200].) The gain applied to the input signal can be varied over a 31-dB range to compensate for VF input levels from +9.0 to −22.0 dBm (in 1-dB steps) by the selection of TX level DIP switch options [+1], [+2], [+4], [+8], and [+16]. The resulting signal is passed to the VF equalizer circuit where the effects of long loaded or nonloaded lines are equalized. The equalization may be varied by DIP switch options [L], [N]; SL [1], [2], [4], [8]; HT [1], [2], [4], [8]; and BW [1], [2], [4], [8]. The resulting signal is passed to the TX office wiring loss (OWL) compensation circuit. The TX prescription OWL options provide 0 to 1.5 dB of gain in 0.1-dB steps to compensate for wiring/cabling losses. The range for the input levels is +9.0 to −23.5 dBm (in 0.1-dB steps). The resulting signal is applied to the encoder.

3.02 The encoder converts the VF signal information to an 8-bit PCM word. When the TX AND gate is activated by the transmit logic unit (TLU) on the TCS4-X and TCS6-X leads, the 8-bit word is applied to the TLU via the TCD bus. The data is clocked out of the unit under control of the 1.536-MHz clock from the TLU.

RECEIVE VF CIRCUIT

3.03 An 8-bit PCM word from the receive logic unit (RLU) is applied to the decoder on the RCD bus. The decoder will only accept the data when the receive (RX) AND gate is activated by the RLU on the RCS4-X and RCS6-X leads. The decoder converts the PCM word into VF signal information.

3.04 The VF signal is applied to the low-pass filter and passed through to the RX OWL compensation circuit. The RX prescription OWL options provide 0 to 1.5 dB of gain in 0.1-dB steps to the signal out of the low-pass filter to compensate for office wiring/cabling losses. The output of this circuit is further amplified. This amplification can be varied over a 31-dB range (in 1-dB increments) by the selection of RX VF level DIP switch options [−1], [−2], [−4], [−8], and [−16]. This provides output levels of +10.5 to −22.0 dBm in 0.1-dB increments with both the OWL and VF level options. The amplified VF is transformer-coupled to the C.O. equipment. The transformer and DIP switch options are identical to those described in Para. 3.01.

4. OPTIONS

4.01 The unit is equipped with DIP switch options for selecting circuit options. Refer to Section ITTR-18-441 for detailed information on option selection.

4.02 The multiplex shelf provides options on the backplane which control the CGA timing of the terminal. Refer to Sections ITTR-18-405 (for shelves mounted in 23-inch bays) or ITTR-18-406 (for shelves mounted in 19-inch bays) for option selection information on these options.

5. RESTRICTIONS

WARNING: This unit contains static-sensitive (CMOS) devices. Section ITTR-18-599 contains handling instructions for CMOS-equipped units.

6. TEST AND MAINTENANCE FEATURES

6.01 A description of the test and maintenance features of the unit is provided in Table A. Refer to Fig. 1 for the physical location of these features.

TABLE A

FEATURE	REF. DES.	FUNCTION
Splitting Card Jack	J1	Provides test/break jack access to C.O. equipment and channel unit drop sides of T, R, T1, and R1 leads.
EQ OUT Test Points	TP1 and TP2	Provide test points for equalizer measurement.

7. TECHNICAL SUMMARY

7.01 A summary of technical specifications for the unit is given in Table B.

TABLE B

ITEM	SPECIFICATION
DC POWER	
Voltage	**Current Drain (nominal)**
+5V (Gnd)	14 mA
−10V	2.0 mA (at 5V)
+7V	5.0 mA (at 12V)
−17V	5.0 mA (at 12V)

TABLE B (CONT)

ITEM	SPECIFICATION
VF PERFORMANCE	
Impedance	600 ohms balanced; 150 ohms balanced; or 1200 ohms balanced (switch selectable)
Levels	
Transmit	+9.0 to −23.5 dBm adjustable in 0.1-dB steps
Receive	+10.5 to −22.0 dBm adjustable in 0.1-dB steps
Loss Stability (End-to-End)*	±0.5 dB over life in 95% of the circuits
Tracking (End-to-End)	
−37 to +3 dBm0 Input	0.5 dB maximum deviation
−50 to −37 dBm0 Input	1.0 dB maximum deviation
Idle Channel Noise (End-to-End)	23 dBrnc0 maximum
Signal-to-Distortion	
0 to −30 dBm0 Input	33 dB minimum overall; 35 dB minimum receive or transmit
−40 dBm0 Input	27 dB minimum overall; 29 dB minimum receive or transmit (deviation to 1 dBrnC for −21 dBm TLP)
−45 dBm0 Input	22 dB minimum overall; 25 dB minimum receive or transmit (deviation to 1 dBrnC for −20 dBm TLP)
Single Frequency Distortion (at 0 dBm0)*	
Input Swept from 0 to 12 kHz	−28 dBm0 maximum at any other frequency
Input between 1004 and 1020 Hz	−40 dBm0 or less at any other frequency of 0 to 4 kHz with a distortion contribution objective from either transmit or receive of typically 6 dB better

TABLE B (CONT)

ITEM	SPECIFICATION
Return Loss	
600 Ohms	
1000 Hz	28 dB minimum
300 to 3000 Hz	23 dB minimum
150 or 1200 Ohms	
1000 Hz	23 dB minimum
300 to 3000 Hz	20 dB minimum
Frequency Response (Referenced 1020 Hz End-to-End)*	
200 Hz	0, −3.0 dB
300 to 3000 Hz	±0.3 dB
3200 Hz	+0.15, −1.5 dB
3400 Hz	0, −3.0 dB
Longitudinal Balance (AT&T or IEEE Method)	
At each VF port with simplex lead open	
200 Hz	86 dB minimum
1000 Hz	80 dB minimum
3000 Hz	78 dB minimum
With 300 ohms between simplex lead and ground	
200 Hz	66 dB minimum
1000 Hz	60 dB minimum
3000 Hz	58 dB minimum
*600-ohm setting	
OPERATING ENVIRONMENT	
Temperature	0° to 55°C
Humidity	To 95% at 40°C (no condensation)
Altitude	To 14,000 ft (4,300 m)
DIMENSIONS	
Width	0.8 in. (1.9 cm)
Height	5.9 in. (15.0 cm)
Depth	9.7 in. (24.6 cm)
WEIGHT	0.5 lb (0.2 kg)

8. REPLACEABLE PARTS

8.01 This unit has no field-replaceable parts.

9. REFERENCES

9.01 The engineering drawings noted in Table C were used in the preparation of this Section.

TABLE C

TYPE	DRAWING NO.
Assembly	628210-000
Schematic	628210-002

9.02 Related information on the unit may be found in the ITTR Sections referenced in Table D.

TABLE D

TITLE	SECTION NO.
Connectorized Multiplex Shelf (MS/WC7, MS/WC5, MS/C7 and MS/C6), 628001, 628005, 628011 and 628015 (For 23-Inch Bays) — Option Selection, Installation and Pretest	ITTR-18-405
Connectorized Multiplex Shelf (MS19/WC7, MS19/WC5, MS19/C7 and MS19/C6), 628003, 628008, 628013 and 628018 (For 19-Inch Bays) — Option Selection, Installation and Pretest	ITTR-18-406
Special Service Channel Units — Option Selection and Installation	ITTR-18-441